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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/733,474	12/08/2000	Minoru Sugawara	09792909-4740	2651

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10/08/2002

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EXAMINER

NGUYEN, JOSEPH H

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 10/08/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/733,474

Applicant(s)

SUGAWARA ET AL.

Examiner

Joseph Nguyen

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

The abstract of the disclosure is objected to because it contains more than 150 words. The abstract should contain no more than 150 words in a single paragraph.

Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation "a second silicon epitaxial layer formed on said first silicon layer" is not supported by the specification. This limitation is not clearly disclosed or defined anywhere in the specification in such a way one having ordinary skill in the art can make and use.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 recites the limitation "cap layer" in 1. There is insufficient antecedent basis for this limitation in the claim. There is no such cap layer recited in claim 11 from which claim 12 depends.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-7, 9, 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo et al in view of Taylor et al.

Regarding claim 4, Kubo et al discloses on figures 13 a semiconductor device with p channel and n channel field effect devices formed on a common substrate 10, comprising a silicon substrate 10 with p type channel and n type channel field effect regions corresponding to said p channel and n channel field effect devices, respectively, said n channel field effect region having a silicon germanium buffer layer 14n on said substrate 10, a silicon germanium compound relax layer 15n on said buffer layer, a first silicon layer 17n formed on said relax layer and a second silicon epitaxial layer formed on said first silicon layer, a concentration of germanium in said buffer layer being graduated so that it increases proceeding from a substrate side of said buffer layer to a relax layer side of said buffer layer, a concentration of germanium in said relax layer being substantially the same as the concentration of germanium at said relax layer side of said buffer layer, said p channel field effect region having a silicon germanium

Art Unit: 2815

compound layer formed on said substrate and a silicon cap layer 17p formed on said silicon germanium compound layer,...drain and source regions 25p of said p channel field effect device being within said silicon germanium compound layer 15p formed on said substrate and said silicon cap layer 17p formed on said silicon germanium compound layer 15p.

Kubo et al does not disclose drain and source regions of said n channel field effect device being within said second silicon epitaxial layer. However, Taylor et al discloses on figure 14 drain and source regions 1116 of said n channel field effect device being within said second silicon epitaxial layer 1104. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Imai et al by having drain and source regions of said n channel field effect device being within said second silicon epitaxial layer the purpose of obtaining the high quality of the channel in terms of carrier mobility.

Regarding claim 5, Kubo et al discloses on figure 13 a ratio of germanium to silicon in said buffer layer 14n increases from 0.0 to less than about 0.5 proceeding from said substrate side to said relax layer side of said buffer layer.

Regarding claim 6, Kubo et al discloses on figure 13 the ratio of germanium to silicon in said buffer layer 14n is not greater than about 0.3.

Regarding claim 7, Kubo et al and Taylor et al disclose substantially all the structure set forth in the claimed invention except the buffer layer being about 1.68 micrometers thick and the relax layer being about 0.6 micrometers thick. However, it would have been obvious to one having ordinary skill in the art at the time of the

Art Unit: 2815

invention was made to modify Kubo et al and Taylor et al by having the buffer layer being about 1.68 micrometers thick and the relax layer being about 0.6 micrometers thick for the purpose of improving the performance of a semiconductor device, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 9, Kubo et al discloses on figure 13 said silicon germanium compound layer 15p has a ratio of germanium to silicon of about 0.1 to less than about 0.8.

Regarding claim 11, Kubo et al and Taylor et al disclose substantially all the structure set forth in the claimed invention except the second epitaxial layer having a thickness of about 100 nm. However, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Kubo et al and Taylor et al by having the second epitaxial layer having a thickness of about 100 nm for the purpose of improving the performance of a semiconductor device, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 12, Kubo et al and Taylor et al disclose substantially all the structure set forth in the claimed invention except the cap layer having a thickness of about 100 nm. However, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Kubo et al and Taylor et al by having the cap layer having a thickness of about 100 nm for the purpose of improving the performance of a semiconductor device, since it has been held that discovering an

Art Unit: 2815

optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo et al and Taylor et al as applied to claim 4 above, and further in view of Imai et al.

Regarding claim 8, Kubo et al and Taylor et al disclose substantially all the structure set forth in the claimed invention except the silicon germanium compound layer in the p channel field effect region having a thickness of about 100 nm. However, Imai et al disclose on figure 3K the silicon germanium compound layer 12 in the p channel field effect region having a thickness of about 100 nm (col. 7, lines 60-63). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kubo et al and Taylor et al by having the silicon germanium compound layer in the p channel field effect region having a thickness of about 100 nm for the purpose of improving the performance of a semiconductor device.

Regarding claim 10, Kubo et al and Taylor et al and Imai et al together disclose the structure set forth in claim 10.

Response to Arguments

Applicant's arguments with respect to claims 4-12 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See

MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

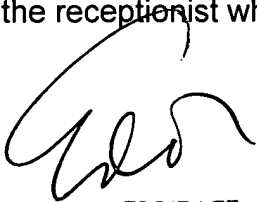
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (703) 308-1269. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 308-7382 for regular communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JN
October 3, 2002



EDDIE LEE
SUPERVISORY PATENT EXAMINER
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